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Cooperative Extension South Dakota State University

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# irrigating barley



Cooperative Extension Service  
South Dakota State University  
U.S. Department of Agriculture

# irrigating barley

Phil Price

An irrigation system is a large investment. To make it pay, a grower has to use it, sometimes on other than the traditional corn and soybeans.

One such crop is barley. Irrigated barley is an important crop in the northwestern United States, and demand for irrigated malting barley is growing stronger in South Dakota. This is an opportunity for irrigators who want the most from their systems.

Barley is one of the best crops to grow under irrigation. It has the shortest life cycle (time span from sowing of seed to combining of mature grain) of any of the cereal grains. This short time period reduces the chances of crop loss from unfavorable weather and increases the opportunity for double cropping if an early maturing barley variety is grown.

Under generally good growing conditions, if proper attention is given to seedbed preparation, soil fertility, variety selection, and the timely application of water, high yields of good quality barley can be produced. When these requirements and conditions are met, the irrigator can expect yields of 100-125 bu/A (53.9-67.2 q/ha) with 50- to 52-pound bushel weights (64.4 to 67.0 kg/hl). Grain of this quality will usually qualify for the malting premium or be an excellent feed grain for livestock.

## Salt Tolerance

Salinity is not a problem in most of the soils of South Dakota now being put under irrigation. However, salts can accumulate over a period of years if soil drainage is poor. Under these conditions of "salting in," a crop

must be grown that has salt tolerance.

Barley is the most salt tolerant of all the cereal grains, and it expresses this tolerance well during all stages of growth. Barley will grow in soils that contain as much as 1.0% salts; this crop should be given first consideration for production on problem soils.

Most of the barley varieties in production in the north central United States are genetically related, so variations in salt tolerance should not be a factor in selecting the barley variety to be grown.

## Soil Fertility

High barley yields are not possible unless adequate amounts of mineral nutrients are present in available form in the soil. The amount of fertilizer to be applied will depend on soil texture, existing soil reserves, and desired yield.

The natural fertility that once existed in South Dakota soils has been depleted by annual cropping, so nearly every soil to be used for irrigated cropping will require fertilization. Nitrogen, phosphorus, and potassium are the principal nutrients required by barley plants. A number of others, such as calcium, magnesium, and sulfur, are required in lesser amounts. Several so-called trace elements (boron, chlorine, copper, iron, manganese, molybdenum, and zinc) are also needed.

Very few soils seem to require the addition of anything other than nitrogen, phosphorus and potassium. Possible deficiencies in the other elements might exist after several years of irrigation; these will have to be determined

through soil tests if deficiency signs appear.

A considerable portion of the total nitrogen, phosphorus, and potassium absorbed by the barley roots is taken in before the boot stage. Therefore, it is important that these nutrients are available to the plant early in the spring. Placement of these nutrients, especially phosphorus and potassium, near the seed with a fertilizer attachment can be important in promoting good plant growth. Excess amounts of water will increase the leaching of nutrients, especially in lighter soils, and should be avoided or compensated for by top dressing or fertilizing with nitrogen during the growing season.

## Rate of Seeding

Many growers sow barley at too high a rate per acre and this is especially true when the crop is to be irrigated. High rates waste seed, produce an overcrowded stand in which plants tiller less and develop smaller heads, and can even cause a reduction in yield when compared with lower rates of seeding. Under good irrigation management, the seeding rate for barley should range from  $\frac{3}{4}$  to  $1\frac{1}{4}$  bu/A (6.4-10.9 dkl/ha). The precise rate will depend upon several factors: percent germinability of the seed, time of seeding, soil type, and fertility level. The lower rate ( $\frac{3}{4}$  bu) (6.4 dkl) is recommended on heavier soils with early seeding (by April 15), and the higher rate ( $1\frac{1}{4}$  bu) (10.9 dkl) on lighter soils with a seeding date after May 1. Seeding of barley should always be accomplished as soon as possible after March 15 to obtain the highest yield of good quality grain.



## Weed Control

Good weed control is essential in all cropping situations, but it is mandatory when striving for maximum yields. Weeds compete for moisture and soil nutrients, shade crop plants, and harbor insect pests that can transmit plant diseases.

Another bad point about weeds is that their seeds get into the threshed grain. The lowered quality of the grain and additional cleaning costs further reduce net profit per acre.

Early seeding will often permit the development of a leaf canopy that shades the ground and delays weed seed germination, but this is certainly not a dependable method of controlling weeds in barley.

The use of recommended herbicides is the best way to prevent yield loss due to weeds. It is important to spray with the correct herbicide, at the proper rate, and at the proper times so that weeds are effectively controlled and crop plants are not damaged.

Control of broadleaved weeds is achieved with 2,4-D or MCPA in the amine or ester formulation. Apply when the crop is between the five-leaf and early boot stage. Rates of  $\frac{1}{2}$  lb/A (560.7 gms/ha) of 2,4-D ester or  $\frac{3}{4}$  lb/A (839.9 gms/ha) of acid equivalent of 2,4-D amine or MCPA ester or amine seldom cause appreciable crop damage.

Bromoxynil (tradename *Brominal* or *Buctril*) is an effective herbicide on wild buckwheat. Apply  $\frac{1}{4}$  to  $\frac{3}{8}$  lb/A (280.1 to 420.2 gms/ha) of acid equivalent, or 1 to  $1\frac{1}{2}$  pints of product per acre (1.16 to 1.75 l/ha) when grain has reached the two-leaf stage and before the boot stage.

For broader spectrum weed control (wild buckwheat and broadleaves) mix  $\frac{1}{4}$  lb/A (279.1 gms/ha) of acid equivalent of MCPA or 2,4-D ester with  $\frac{1}{4}$  to  $\frac{3}{8}$  lb/A (280.1-420.2 gms/ha) bromoxynil (*Brominal* only). The

mixture of MCPA ester and bromoxynil (tradenames *Brominal Plus* or *Bronate*) is available commercially. Use 1 to  $1\frac{1}{2}$  pints of this premix per acre (1.16-1.75 l/ha) and apply between the five-leaf and boot stages.

**Never** use dicamba (tradename *Banvel*) to control wild buckwheat in barley. Three herbicides, triallate (*Far-go*), barban (*Carbyne*), and difenzoquat (*Avenge*) are available for wild oat control.

Apply triallate preplanting or premergence at the rate of  $1\frac{1}{4}$  lb active ingredient per acre (1.4 kg/ha), or  $1\frac{1}{4}$  quarts product per acre (2.91 l/ha). Apply to a thoroughly prepared seedbed and work into the soil no more than 2 inches (5 cm) deep immediately following the application.

Barban should be applied at the rate of  $\frac{1}{3}$  to  $\frac{3}{8}$  lb active ingredient per acre (373.4 to 420.2 gms/ha), or  $1\frac{1}{4}$  quarts product per acre (2.91 l/ha) when wild oat plants are in the two-leaf stage. Barban should not be used later than 14 days after emergence or after the crop reaches the four-leaf stage.

Difenzoquat should be sprayed when the wild oat plants are in the three- to five-leaf stage at the rate of  $\frac{3}{4}$  - 1 lb active ingredient per acre (739.4 to 1120.4 gms/ha), or  $2\frac{1}{2}$  to 4 pints of product per acre (2.91 to 4.67 l/ha). The high rate should be used on heavy infestations of more than 25 plants per square foot (278/sq m). Crop damage is possible under stress conditions.

Barley fields should not be grazed or used as forage after treatment with most herbicides. Be certain to read the herbicide label before allowing animals access to sprayed plants.

## Times to Irrigate

There are three critical times in the life of the barley plant when good soil moisture is

essential for maximum growth and development. These times are seed germination, three-leaf stage, and late boot stage.

Good soil moisture at the time of grain sowing ensures rapid and even germination of the seed and this provides for a good stand.

The amount of tillering done by a barley plant is determined to a considerable degree by growing conditions at the three-leaf stage. Under usual South Dakota growing conditions, soil moisture can be deficient and water should be applied as quickly as possible if it is needed to promote tillering.

At boot stage, the time is rapidly approaching when pollination and seed set occur. Lack of adequate soil moisture at this time can adversely influence pollen release and cause sterility in part of the spike.

## Aids to Proper Irrigation

Proper water management requires an understanding by the operator of both the crop needs and the texture, structure, and organic matter of the soils on his farm. This knowledge will permit him to irrigate wisely.

The right time for irrigating can be determined through the use of several tools or instruments. The metal soil probe is the simplest and least expensive way of determining moisture conditions. The probe should be at least 3 feet (0.914 m) long and constructed so that it is easily cleaned. Some types of instruments are available for determining soil moisture. A probe type with a meter is used to some extent, but generally unreliable readings are obtained. The vacuum tensiometer is the most widely used instrument; it gives the truest indication of soil moisture conditions without frequent calibration.

Soil moisture resistance blocks also provide this information, but the necessity to calibrate each

block separately and repeatedly reduces their usefulness.

Most irrigators still rely primarily on the metal soil probe and the feel of the soil withdrawn to determine whether irrigation is needed

A new service named AGNET has recently become available through South Dakota State University to irrigators in South Dakota. A fee is charged for the information provided. Data gathered on net soil water changes due to rainfall and evapotranspiration are fed into a computer at Lincoln, Nebraska. If computer calculations indicate a need, irrigators are notified to apply water. Interested irrigators should contact their

Extension county agent for details about AGNET.

## Selecting a Barley Variety

The varieties in production in South Dakota at the present time were not developed for irrigated cultivation. A few of the varieties have been tested by the South Dakota Experiment Station and grown commercially under irrigation.

Of the six-row varieties, Primus II, Larker, Prilar, and Morex perform well. Primus II is slightly shorter, earlier, and stands better than the other three and is recommended as the

best of this group for irrigated production.

Firlbecks III is the best two-row variety available. However, it is susceptible to stem rust and should not be grown east of the Missouri River.

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